## Claims

1. A process for the production of ethanol through fermentation of organic starting materials, **characterized** in that at least one fungus belonging to the species *Chalara* is used, said fungus being capable of metabolizing pentose compounds.

2. The process according to claim 1, wherein said at least one fungus is capable of metabolizing both pentose and hexose compounds.

3. The process according to claim 1, wherein said at least one fungus is used in a mix of fungi, further comprising at least one second fungus belonging to the species *Trametes*.

4. The process according to claim 1, wherein said at least one fungus is *Chalara parvispora.*

5. The process according to claim 3, wherein said second fungus is *Trametes versicolor.*

6. The process according to claim 3, wherein said mix of fungi further comprises one or more fungi chosen among *Trichoderma sp.*, *Thielavia sp.*, *Postia sp.*, *Gloeophyllum sp.*, *Phanerochaete sp.*, or a combination thereof.

7. The process according to claim 3, wherein said mix of fungi comprises the fungi *Chalara parvispora,* and *Trametes versicolor;* and at least one of *Trichoderma viride*, *Thielavia terrestris*, *Postia placenta, Gloeophyllum trabeum*, *Phanerochaete chrysosporium,* or a combination thereof.

8. The process according to claim 1 or 3, wherein said fungus or mix of fungi is used in combination with at least one yeast.

9. The process according to any of claims 1 - 8, wherein said at least one fungus or mix of fungi is added prior to, or substantially simultaneously with the addition of the yeast.

10. The process according to claim 8, wherein said yeast is a yeast belonging to the species *Saccharomyces*.

11. The process according to claim 8, wherein said yeast is *Saccharomyces cerevisiae*.

12. The process according to any of claim 1 - 11, wherein the fermentation is performed as batch fermentation.

13. The process according to any of claim 1 - 11, wherein the fermentation is performed as a continuous or semi-continuous process, where starting materials and/or nutrients are added during fermentation.

14. The process according to any of claim 1 - 11, wherein the pH of the starting material is adjusted to the range of about pH 4.5 – 7,

15. The process according to claim 14, wherein the pH is adjusted to the range of about 5.5 – 6.5

16. The process according to claim 14, wherein the pH is adjusted to about pH 6.

17. The process according to any of claim 1 - 11, wherein the fermentation is performed in a temperature interval of about 20 to about 40 °C.

18. The process according to claim 17, wherein the temperature is in the interval of about 26 to about 36 °C.

19. The process according to any of claim 1 - 18, wherein the starting material is chosen among:

wood or non-wood plant materials;

- waste or by-products from forestry, such as wood chips, saw dust etc;
- solid or liquid effluents or by-products from pulp and paper industry, such as wood hydrolysates
- solid or liquid effluents or by-products from food and feed industry, for example, effluents or by-products containing cellulose, hemicellulose, sugar or starch;
- solid or liquid waste or by-products from agriculture;
- other waste or by-product streams or their components comprising compounds that can be fermented to produce ethanol; and
- any of the above-mentioned materials in treated or untreated from.

20. A process for the production of ethanol from a starting material consisting substantially of waste or by-products from forestry, **characterized** in that at least one fungus belonging to the species *Chalara* is used, said fungus being capable of metabolising pentose compounds.

21. The process according to claim 20, wherein said at least one fungus is capable of metabolizing both pentose and hexose compounds.

22. The process according to claim 20, wherein said at least one fungus is used in a mix of fungi, said mix further comprising at least one second fungus belonging to the species *Trametes*.

23. The process according to claim 20, wherein said at least one fungus is *Chalara parvispora*.

24. The process according to claim 22, wherein said at least one second fungus is *Trametes versicolor*.

25. The process according to claim 22, wherein said mix of fungi further comprises one or more fungi chosen among *Trichoderma sp.*, *Thielavia sp.*, *Postia sp.*, *Gloeophyllum sp.*, *Phanerochaete sp.*, or a combination thereof.

26. The process according to claim 22, wherein said mix of fungi comprises the fungi *Chalara parvispora and Trametes versicolor*; and at least one of *Trichoderma viride, Thielavia terrestris, Postia placenta, Gloeophyllum trabeum, Phanerochaete chrysosporium,* or a combination thereof.

27. The process according to claim 20, wherein said fungus is used in combination with at least one yeast.

28. The process according to any one of claims 20 - 27, wherein the starting material comprises spent liquor (waste liquor) from pulping.

29. A starter culture for use in a process according to any of the above claims, comprising *Chalara parvispora* and at least one fungus chosen among *Trametes sp., Trichoderma sp., Thielavia sp., Postia sp, Gloeophyllum sp, Phanerochaete sp,* or a combination thereof.

30. The starter culture according to claim 29, comprising *Chalara parvispora* and *Trametes versicolor;* and at least one of *Trichoderma viride, Thielavia terrestris, Postia placenta, Gloeophyllum trabeum, Phanerochaete chrysosporium,* or a combination thereof.

31. The starter culture according to claim 29 or 30, further comprising a yeast.

32. A growth medium for a fungus used in the process according to any of claims 1 - 28, comprising $CaCl_2$ $2H_2O$ at a final concentration of about 0.0130 g/l, $MgSO_4$ $7H_2O$ at a final concentration of about 0.030 g/l, $K_2HPO_4$ at a final concentration of about 0.95 g/l, $NaH_2PO_4$ $2H_2O$ at a final concentration of about 0.80 g/l, D-xylose at a final concentration of about 25 g/l, D-mannose at a final concentration of about 25 g/l, D-galactose at a final concentration of about 25 g/l, $NH_4Cl$ at a final concentration about 0.5 g/l, and salts at a final concentration about 0.040 g/l

33. The growth medium according to claim 32, further comprising starch at a final concentration of about 25 g/l.